S
14.GS:
CIR 355
c. 1

ILLINOIS GEOLOGICAL
SURVEY LIBRARY

STATE OF ILLINOIS
DEPARTMENT OF REGISTRATION AND EDUCATION

CONODONTS FROM THE ST. LOUIS FORMATION (VALMEYERAN SERIES) OF ILLINOIS, INDIANA, AND MISSOURI

Carl B. Rexroad
Charles Collinson

ILLINOIS STATE GEOLOGICAL SURVEY
John C. Frye, *Chief* URBANA

CIRCULAR 355 1963

990(132)
ISGS
C 355
1963

Digitized by the Internet Archive
in 2012 with funding from
University of Illinois Urbana-Champaign

http://archive.org/details/conodontsfromstl3553rexr

CONODONTS FROM THE ST. LOUIS FORMATION (VALMEYERAN SERIES) OF ILLINOIS, INDIANA, AND MISSOURI

Carl B. Rexroad and Charles Collinson

ABSTRACT

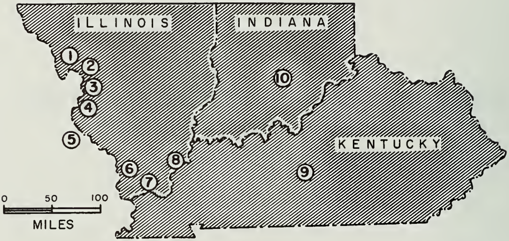
The conodont faunas of the St. Louis Formation were studied from the longest and best exposures in the Mississippian outcrop belt around the Illinois Basin, including type sections of both the St. Louis and Ste. Genevieve Formations. Faunas were found to be common in the upper part of the St. Louis but sparse in the lower. Altogether they consist of 21 species, representing the genera Apatognathus?, Cavusgnathus, Hibbardella, Ligonodina, Lonchodina, Magnilaterella, n.gen., Neoprioniodus, Ozarkodina, Spathognathodus, Taphrognathus and one unnamed new genus. Three new taxa, Magnilaterella, n.gen., Magnilaterella robusta, n.sp., and Ozarkodina laevipostica, n.sp., are proposed herein.

Two genera from the St. Louis are especially useful for biostratigraphic zonation: Taphrognathus was found to occur only as high as the middle of the formation and Cavusgnathus no lower than the middle. In addition, three species, Apatognathus? gemina, A? porcata, and Spathognathodus scitulus, are common and confined to the upper part of the formation.

In general, the conodont faunas of the St. Louis are transitional with those of the underlying Warsaw and Salem Formations and are abruptly different from faunas of the overlying Ste. Genevieve Formation. Within the St. Louis there are distinctive but transitional faunal differences between upper and lower parts of the formation.

INTRODUCTION

The St. Louis Limestone was named by Engelmann in 1847 for limestone cropping out in the vicinity of St. Louis, Missouri. In the original usage, the formation occupied the interval between the Warsaw and Aux Vases Formations, but



Text-fig. 1–Localities of the St. Louis Formation from which conodonts were collected; see COLLECTING LOCALITIES for descriptions.

in 1860 Shumard split off the upper part of the limestone and applied to it the name Ste. Genevieve Limestone. In 1904 Ulrich further restricted the St. Louis to include only the rocks between the newly named Salem Limestone below (Cumings, 1901) and the Ste. Genevieve Limestone above. Although this definition is still in general use, there is much difficulty in delimiting precisely the formational boundaries because of similar lithologies and confusion of the faunas.

The purpose here is to describe conodonts from rocks presently classified as St. Louis as a requisite to future stratigraphic interpretation. Because many early collections of fossils were made without stratigraphic control and before the definitions of the formations were generally stabilized, faunal lists commonly reflect gross errors. Because the ultimate purpose of the description of the conodonts is stratigraphic, these same difficulties must be avoided here. To do so we have carefully collected samples and described localities so that, regardless of what stratigraphic name is applied, the collecting intervals are known and the collections can be duplicated. In our project, the initial studies were confined to the type area of the St. Louis Limestone (Text-fig. 1, Localities 1-4) where both the lower and upper boundaries are present and then were extended to the type area of the Ste. Genevieve Limestone (Locality 5). Only after the faunal relationships were well established in these two areas was the areal extent of the study expanded to southern Illinois, Indiana, and Kentucky.

GENERAL ASPECTS OF THE FAUNAS

Our collection of over 2,000 specimens from the St. Louis shows 21 species, two newly named herein and three unnamed, representing eleven genera, one named here and one yet unnamed. Genera include the platform types Cavusgnathus and Taphrognathus as well as Apatognathus?, Hibbardella, Ligonodina, Lonchodina, Neoprioniodus, Ozarkodina, Spathognathodus, the new genus, Magnilaterella, and one unnamed genus. Fragments of a variety of hindeodellids are also present.

Of the genera, Apatognathus? is of special interest because it may represent an extension of the range of the Upper Devonian genus Apatognathus, although it seems more likely to be a homeomorph of the older form. The question mark denotes this uncertainty. In the lower part of the St. Louis and in the Warsaw and Salem Formations, there are a few specimens which might represent Apatognathus, but no such forms have been recorded in the lower Mississippian, although that part of the stratigraphic column has been the subject of much research in the Mississippi Valley and in Germany. Thus the absence suggests homeomorphy. Apatognathus? is rare in the lower part of the St. Louis but is the dominant genus in the upper part.

Of special biostratigraphic significance, the St. Louis Limestone contains the youngest occurrence of Taphrognathus as well as the oldest occurrence of Cavusgnathus. The former is uncommon in the lower part of the St. Louis, i.e., that part below the main breccia bed at Localities 1 and 2, and only a few specimens have been found above the main breccia. Cavusgnathus is very common above the breccia but occurs only rarely below and then only in the uppermost part of the lower St. Louis. This vertical distribution, plus the presence of specimens transitional between the two genera, just above and below the main breccia bed, supports the homeomorphy of Taphrognathus with Streptognathodus, which first appears in the uppermost part of the Chesterian Series. All other genera in our collections are long ranging.

The species Spathognathodus scitulus and Apatognathus? gemina are abundant. Of common occurrence and listed in order of decreasing abundance are: Ligonodina levis, Neoprioniodus tulensis, Apatognathus? porcata, Cavusgnathus unicornis, and less common Hibbardella abnormis, Ozarkodina laevipostica, and O. sp. Uncommon species include: Neoprioniodus varians, Lonchodina sp., Taphrognathus varians, Hibbardella ortha, Magnilaterella sp., Neoprioniodus loxus, Cavusgnathus characta, C. regularis, Ozarkodina curvata, Cavusgnathus n.sp., and Magnilaterella robusta. In addition, seven species are represented by only one or two specimens. Their presence must be discounted in any stratigraphic interpretation, but some are probably indigenous and represent extensions of ranges. The species are: Cavusgnathus convexa, Gnathodus commutatus, G. texanus, Neoprioniodus camurus, N. singularis, Elsonella? spp., Falcodus? sp. and Lambdagnathus sp.

Any study of conodont faunas should relate abundance of species to stratigraphic ranges. Based on established ranges only, the species limited to the St. Louis (Apatognathus? gemina, A? porcata, Cavusgnathus-Taphrognathus transition forms, Lonchodina sp., Ozarkodina laevipostica, and Spathognathodus scitulus), those found only in St. Louis and underlying units (Hibbardella abnormis, Neoprioniodus tulensis, and Taphrognathus varians), and those found only in the St. Louis and overlying units (Cavusgnathus characta, C. regularis, and C. unicornis, present a transitional sequence without evidence of a major faunal break. However, when the abundance of the species and their vertical distribution within the St. Louis are noted and are related to the faunas from the underlying and overlying units, the picture is of transition from below and a relatively sharp break at the upper boundary.

For example, Apatognathus? and Spathognathodus scitulus represent two-thirds of the collection from the upper St. Louis in the type area. Yet these and seven additional species have not been found in the overlying Ste. Genevieve

Limestone. Thus, 75 percent of the St. Louis specimens represent species not found in the Ste. Genevieve and only 25 percent are of species that continue into the younger beds, which contain a typical Chesterian fauna.

Unfortunately the fauna of the lower part of the St. Louis Limestone in the type area is so sparse as to make comparison with the underlying formations, as well as the upper part of the St. Louis, difficult. Taphrognathus varians is the most common species in the lower St. Louis and its presence serves to differentiate the lower from the upper part of the formation. The species also occurs in the underlying Salem Limestone but is common to abundant there so that the greater numbers characterize that formation. Lonchodina sp., which appears to be restricted to St. Louis rocks in the type area, may be useful in separating Salem from St. Louis. The earliest occurrences of Spathognathodus scitulus, Apatognathus? gemina, and A? porcata also help to identify the lower St. Louis, even though all are less than common and have not been found in the lowermost beds. Thus, there is a zone which is difficult to place both faunally and lithologically.

The change in fauna from lower to upper St. Louis beds is relatively sharp and easily distinguishable. Taphrognathus varians comprises up to 22 percent of the lower fauna but is not present in the upper part of the formation, nor is Lonchodina sp. found in the upper part. Spathognathodus scitulus increases from 3 percent to 21 percent and Apatognathus? from 15 percent to 47 percent going from the lower into upper parts. Ozarkodina laevipostica is limited to the upper St. Louis. Cavusgnathus, which is represented by one or two specimens in the upper part of the lower St. Louis, makes up more than 10 percent of the upper St. Louis conodont fauna.

In summary, the conodont fauna of the St. Louis is distinctive but stands as a partial bridge from typical middle Valmeyeran faunas into the Chesterian type of fauna found in the overlying Ste. Genevieve Limestone. There is a transitional change in faunas from the Warsaw and Salem into the lower St. Louis, another transitional but distinct change from the lower into the upper St. Louis, and an abrupt change from the St. Louis into the Ste. Genevieve. Particularly characterizing the St. Louis fauna are Apatognathus? porcata, A? gemina and Spathognathodus scitulus; adding to the distinctiveness are Ozarkodina laevipostica and Lonchodina sp.

ASSEMBLAGE ZONES

Much of the information produced by this study was utilized by Collinson, Scott, and Rexroad in their 1962 discussion of the biostratigraphic zones of the Devonian and Mississippian in the Mississippi Valley, wherein they proposed two assemblage zones based all or in part on conodonts from the St. Louis. The lower zone, the Taphrognathus varians-Apatognathus? Assemblage Zone, includes the Warsaw, the Salem, and the lower part of the St. Louis Formation of the Mississippi Valley area and is bounded by the earliest occurrence of Apatognathus? and common Taphrognathus varians. The upper limit is marked by the latest regular occurrence of Taphrognathus and the earliest occurrence of abundant Apatognathus?.

That portion of the St. Louis Limestone which occurs above the base of the main breccia bed in the type area and below the base of the Ste. Genevieve Limestone coincides with the Apatognathus? gemina—Cavusgnathus Assemblage Zone. The assemblage zone represents the zone of common Apatognathus? and the upper limit is marked by the latest occurrence of *Spathognathodus scitulus*. The lower limit nearly coincides with the earliest occurrence of common *S. scitulus* and does coincide with the earliest occurrence of common *Cavusgnathus* and with the latest regular occurrence of *Taphrognathus*. A few representatives of both *Taphrognathus* and *Cavusgnathus* are found respectively above and below the lower boundary, as are specimens representing forms transitional between the two genera. Thus, a thin zone of transition can be recognized in the Mississippi Valley.

ACKNOWLEDGEMENTS

It is a pleasure to acknowledge Texas Technological College and the Indiana Geological Survey for their help and cooperation. Initial processing and examination of samples from the Alton, Illinois, area were done by Henry Linder, Dan McGregor, and Don McGregor, students at Texas Technological College. The Cave In Rock section was collected by D. H. Swann and J. W. Baxter of the Illinois Geological Survey. H. B. Willman and Romayne Skartvedt, Illinois Survey, and A. J. Scott, University of Texas, critically read the manuscript.

COLLECTING LOCALITIES

The principal localities from which faunas were collected are listed below:

Locality 1: Olin Quarry; SE$\frac{1}{4}$ sec. 4, T. 5 N., R. 10 W., Madison County; St. Charles Quadrangle. Twenty-five feet of Salem Limestone and 115 feet of lower St. Louis Limestone were sampled. For diagram of outcrop and sample intervals, see Collinson & Swann, 1958, p. 14.

Locality 2: Alton North; NW$\frac{1}{4}$ sec. 14 and SE$\frac{1}{4}$ sec. 10, T. 5 N., R. 10 W., Madison County, Illinois; Alton Quadrangle. Eighty feet of upper St. Louis and 15 to 20 feet of Ste. Genevieve Limestone. For diagram of outcrop showing bed numbers, see Collinson, Swann & Willman, 1954, fig. 5.

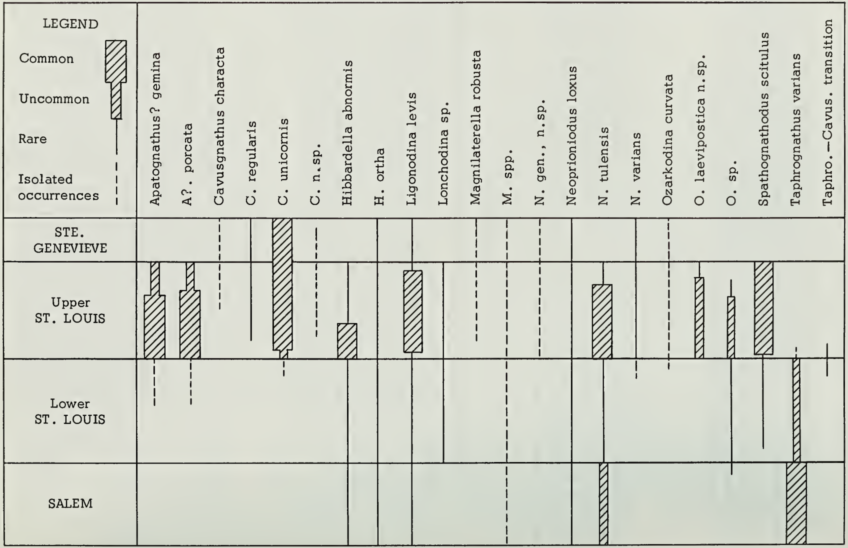
Locality 3: Alton East Quarry; center N$\frac{1}{2}$ sec. 8, T. 5 N., R. 9 W., Madison County, Illinois; Alton Quadrangle. Seven feet of St. Louis Limestone, 27 feet of Ste. Genevieve Limestone, and 5 feet of Aux Vases Sandstone were sampled.

Locality 4: Stolle Quarry; NE$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 14 (extended), T. 1 N., R. 10 W., St. Clair County, Illinois; Cahokia Quadrangle. Only the upper 52 feet of the quarry were sampled. This included 23 feet of upper St. Louis Limestone and 29 feet of Ste. Genevieve Limestone.

Locality 5: Little Rock Quarry; NW$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 17 (extended) and SE$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 8 (extended), R. 9 E., T. 38 N., Ste. Genevieve County, Missouri; Renault Quadrangle. Seventy-five feet of St. Louis and 37 feet of Ste. Genevieve Limestone were sampled. For a description of the section, see Weller, 1928, p. 212-213.

Locality 6: Kratzinger Hollow; NE$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 18, T. 12 S., R. 1 W., Union County, Illinois; Jonesboro Quadrangle. Twenty-five feet of St. Louis Limestone were sampled northeast of the road

TABLE 1 - OCCURRENCE OF CONODONT SPECIES IN THE ST. LOUIS FORMATION IN THE TYPE AREA.



in a small abandoned quarry and 10 feet of St. Louis were sampled 70 feet above road level directly above the quarry. A single sample was taken from 10 feet below road level on the southwest side of the road.

Locality 7: Anna Quarry; NW$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 20 and SW$\frac{1}{4}$ SE$\frac{1}{4}$ sec. 17, T. 12 S., R. 1 W., Union County, Illinois; Dongola Quadrangle. Ninety feet of St. Louis Limestone measured from lowest level of quarry. Uppermost beds in the quarry were inaccessible.

Locality 8: Cave In Rock; SW$\frac{1}{4}$ SE$\frac{1}{4}$ sec. 13, T. 12 S., R. 9 E., Hardin County, Illinois; Cave In Rock Quadrangle. Starting at river level near the west boundary of Cave In Rock State Park and moving eastward, down dip, 153 feet of St. Louis Limestone were sampled.

Locality 9: Knox Knob; both sides of Highway 31 E., north side of Green River, northeastern Hart County, Kentucky. Beginning six feet below the concrete floor of the bridge over Green River 211 feet of section (less 26 feet of covered interval) were sampled. All the samples are referred to the St. Louis. For a diagram of the outcrop, see McGrain & Walker, 1954, p. 22.

Locality 10: Springville Quarry; SE$\frac{1}{4}$ SE$\frac{1}{4}$ sec. 29, T. 6 N., R. 2 W., Lawrence County, Indiana; Oolitic Quadrangle. The lowermost 160 feet of the quarry section were sampled including approximately 75 feet of St. Louis Limestone, 53 feet of Ste. Genevieve Limestone, 5 feet of Aux Vases Formation and 12 feet of Paoli Limestone. For a description of the section, see Perry, Smith & Wayne, 1954, p. 25-30.

SYSTEMATIC DESCRIPTIONS

Type and figured specimens are reposited at the Illinois State Geological Survey under collection number 18P.

Genus APATOGNATHUS Branson & Mehl, 1934

Type species: *Apatognathus varians* Branson & Mehl.

The orientation used here differs from that of the original description because we consider the unit to be bowed and very sharply arched, with the major denticle an apical one. Thus the limbs are anterior and posterior with the apical denticle recurved toward the posterior. As is conventional, the unit is considered bowed convexly toward the outer side.

The fact that no representatives of this genus have been found in rocks of late Kinderhookian or early Valmeyeran age seems to indicate that *Apatognathus*? of the St. Louis Formation is homeomorphic with late Devonian forms assigned to the genus.

APATOGNATHUS? GEMINA (Hinde)

Pl. 1, figs. 12-17

Prioniodus geminus HINDE, 1900, Nat. Hist. Soc. Glasgow, Trans., v. 5, n.s., p. 344, pl. 10, fig. 25.

Prioniodina? gemina (Hinde) HOLMES, 1928, U. S. Natl. Mus., Proc., v. 72, art. 5, p. 19, pl. 5, fig. 10.
Apatognathus geminus (Hinde) CLARKE, 1960, Edinburgh Geol. Soc., Trans., v. 18, pt. 1, p. 4, pl. 1, figs. 1, 2.

A denticle of large size on the posterior limb slightly anterior to its midlength characterizes the genus and distinguishes it from A.? porcata (Hinde) which has nearly uniform denticles on the same limb. The large denticle is not clearly shown in Hinde's figure but is shown in Clarke's photographs of the holotype.

Material studied.—139 specimens.

Repository.—Illinois State Geological Survey, 18P6-18P11 (figured specimens), from Locality 5, St. Louis Formation, 31½ to 33½ feet above the lowest beds in the quarry, and Locality 2, St. Louis Formation, beds B, D, and H.

APATOGNATHUS? PORCATA (Hinde)

Pl. 1, figs. 7-11

Prioniodus porcatus HINDE, 1900, Nat. Hist. Soc. Glasgow, Trans., v. 5, n.s., p. 344, pl. 10, fig. 26; HOLMES, 1928, U. S. Natl. Mus., Proc., v. 72, art. 5, p. 22, pl. 3, fig. 26.
Apatognathus porcatus (Hinde) CLARK, 1960, Edinburgh Geol. Soc., Trans., v. 18, pt. 1, p. 5, pl. 1, figs. 3, 4.

Clarke diagnoses the species as "Similar to Apatognathus geminus but with denticles uniform in height to the cusp and bilateral tumidity of the inner limb more marked."

During ontogeny the angle between the two limbs, as viewed laterally, tends to increase, and at the same time the limbs become less barlike and more bladelike, while the denticles along one limb near the apical denticle tend to lengthen more than the remaining denticles. Some adults tend to retain the juvenile characteristics and form a somewhat distinctive group, a morphotype rather than a subspecies.

Material studied.—239 specimens.

Repository.—Illinois State Geological Survey, 18P1-18P5 (figured specimens), from Locality 2, St. Louis Formation, bed D.

Genus CAVUSGNATHUS Harris & Hollingsworth, 1933

Type species: Cavusgnathus alta Harris & Hollingsworth

CAVUSGNATHUS CHARACTA Rexroad

Pl. 1, fig. 29

Cavusgnathus characta REXROAD, 1957, Illinois Geol. Survey Rept. Inv. 199, p. 15, pl. 1, fig. 2.

The St. Louis representatives of this species are somewhat more variable than those from the overlying formations. The notch which particularly characterizes the species seems to be a primitive feature reflecting the transition form Taphrognathus to Cavusgnathus, as is the outward offset of the blade from the anterior end of the outer parapet.

Material studied.—8 specimens from this study.

Repository.—Illinois State Geological Survey, 18P12 (figured specimen), from Locality 4, St. Louis Formation, 34 to 48 feet below uppermost beds in quarry.

CAVUSGNATHUS REGULARIS Youngquist & Miller

Pl. 1, fig. 28

Cavusgnathus regularis YOUNGQUIST & MILLER, 1949, Jour. Paleontology, v. 23, p. 619, pl. 101, figs. 24, 25; REXROAD & BURTON, 1961, Jour. Paleontology, v. 35, p. 1152, pl. 138, figs. 13, 15.

Representatives from the St. Louis tend to have slightly smaller denticles than those from younger strata but are here referred to C. regularis on the basis of its short, stout shape, its high platform, deep median groove and short blade.

Material studied.—25 specimens.

Repository.—Illinois State Geological Survey, 18P13 (figured specimen), from Locality 10, St. Louis Formation, uppermost 2 feet of Unit 1 of Perry, Smith & Wayne, 1954, p. 28.

CAVUSGNATHUS UNICORNIS Youngquist & Miller

Pl. 1, figs. 26, 27

Cavusgnathus unicornis YOUNGQUIST & MILLER, 1949, Jour. Paleontology, v. 23, p, 619, pl. 101, figs. 18-23; REXROAD, 1957, Illinois Geol. Survey Rept. Inv. 199, p. 17, pl. 1, fig. 7; ?LYS & SERRE, 1957, Inst. Franç. Pétrole, Rev., v. 12, n. 10, p. 1042, pl. 2, figs. 3a, b; REXROAD, 1958, Illinois Geol. Survey Rept. Inv. 209, p. 17, pl. 1, figs. 6-11; REXROAD & BURTON, 1961, Jour. Paleontology, v. 35, p. 1152, pl. 138, figs. 10-12.

The specimen referred by Higgins (1961, pl. 10, fig. 3) to C. unicornis is here referred to C. navicula (Hinde) on the basis of the configuration of the parapet, angle of the blade, and shape of the basal cavity.

Material studied.—129 specimens from this study.

Repository.—Illinois State Geological Survey, 18P14, 18P15 (figured specimens), from Locality 4, St. Louis Formation, 47 to 52 feet below the uppermost beds in the quarry, and Locality 2, St. Louis Formation, bed D.

CAVUSGNATHUS n.sp.

Pl. 1, figs. 30-32

Although these specimens are distinctive and do not belong to a described species, the small number of specimens precludes the naming of a new species.

Upper view.—The outer parapet is convex outward and is curved inward where it joins the straight blade, which is about one-fourth free. The inner parapet is straight and thin opposite the blade. It thickens to the posterior. Both parapets are transversely grooved. The trough is deeper anteriorly and becomes obsolescent at the posterior where a few median nodes may be present. The trough is slightly sigmoidal.

Lateral view.—The platform is long and low. The upper margin of the outer parapet is nearly straight, that of the inner parapet is straight posteriorly and downcurved to the anterior. The blade has a low convex upper margin and bears about seven to nine compressed denticles, the posterior three or four fused to their apices.

Lower view.—The centrally located, asymmetric basal cavity is less than half the total length of the specimen. The outer lip of the cavity has the greater flare, and the inner lip is not fully formed anteriorly. The cavity is deepest near its anterior.

Material studied.—5 specimens.

Repository.—Illinois State Geological Survey, 18P16-18P18 (figured specimens), from Locality 5, St. Louis Formation, 22 to 24 feet above lowermost beds in the quarry, and Locality 2, St. Louis Formation, bed K.

Genus HIBBARDELLA Bassler, 1925
Type species: Hibbardella angulata (Hinde)

HIBBARDELLA ABNORMIS Branson & Mehl
Pl. 2, figs. 15, 18, 20, 21

Hibbardella abnormis BRANSON & MEHL, 1940, Denison Univ. Bull., Jour. Sci. Labs., v. 35, p. 184, pl. 6, fig. 14.

This species and H. milleri of the Chesterian Series are similar in general form but differ in the nature of the arch. The original description indicates that the limbs of the arch are much reduced, but the photograph of the holotype shows both limbs of the arch to be broken. The St. Louis specimens have two to four discrete, rounded denticles on each limb of the arch. In young specimens the posterior bar is denticulate and relatively long, but this is not the case with mature individuals.

Material studied.—41 specimens.

Repository.—Illinois State Geological Survey, 18P20-18P23 (figured specimens), from Locality 2, St. Louis Formation, beds D, J, and N, and Locality 9, St. Louis Formation, 62 feet above the bridge floor.

HIBBARDELLA ORTHA Rexroad
Pl. 2, figs. 12, 16

Hibbardella ortha REXROAD, 1958, Illinois Geol. Survey Report Inv. 209, p. 18 pl. 2, figs. 9-12; CLARKE, 1960, Edinburgh Geol. Soc., Trans., v. 18, pt. 1, p. 6, pl. 1, fig. 7; REXROAD & BURTON, 1961, Jour. Paleontology, v. 35, p. 1153, pl. 140, figs. 5, 6.

Prioniodus angulatus Hinde HINDE (part), 1900, Nat. Hist. Soc. Glasgow, Trans., v. 5, n.s., p. 343, pl. 10, fig. 18 (not fig. 19).

Hibbardella angulata (Hinde) HOLMES (part), 1928, U. S. Natl. Mus., Proc., v. 72, art. 5, p. 11, pl. 5, fig. 32 (not figs. 31, 33).

Material studied.—13 specimens from this study.

Repository.—Illinois State Geological Survey, 18P24, 18P25 (figured specimens), from Locality 1, St. Louis Formation, sample 10, and Locality 8, St. Louis Formation, 18 to 21½ feet above lowermost part of section.

Genus HINDEODELLA Ulrich & Bassler (in Bassler, 1925)
Type species: Hindeodella subtilis Bassler

Many fragmental specimens represent this genus in the St. Louis Formation but description is not practical. A typical specimen is illustrated to show the nature of the material (Pl. 2, fig. 32).

Repository.—Illinois State Geological Survey, 18P26 (figured specimen), from Locality 5, St. Louis Formation, 27 to 29 feet above lowermost beds in quarry.

Genus LIGONODINA Ulrich & Bassler (in Bassler, 1925)
Type Species: Ligonodina pectinata Bassler

LIGONODINA LEVIS Branson & Mehl
Pl. 2, figs. 24, 25

Ligonodina levis BRANSON & MEHL, 1940, Denison Univ. Bull., Jour. Sci. Labs., v. 35, p. 185, pl. 6, fig. 10; BISCHOFF, 1957, Hess. Landesamt. Bodenf., Abhl., Hf. 19, p. 30, pl. 5, fig. 8, pl. 6, fig. 25; REXROAD & BURTON, 1961, Jour. Paleontology, v. 35, p. 1154, pl. 141, figs. 7, 8.

Ligonodina obunca REXROAD, 1957, Illinois Geol. Survey Rept. Inv. 199, p. 32, pl. 1, figs. 22, 23; REXROAD, 1958, Illinois Geol. Survey Rept. Inv. 209, p. 21, pl. 3, figs. 7, 8.

Ligonodina sp. YOUNGQUIST & MILLER, 1949, Jour. Paleontology, v. 23, no. 6, p. 620, pl. 101, figs. 12, 13 (not fig. 11).

The specimen referred to L. obunca Rexroad by Higgins (1961, pl. 11, fig. 9) is placed here in synonymy with L. tenuis Branson & Mehl because the proximal denticle of the inner lateral process is definitely anterior to the main cusp.

Material studied.—182 specimens from this study.

Repository.—Illinois State Geological Survey 18P27-18P29 (figured specimens) from Locality 2, St. Louis Formation, bed D, Locality 6, St. Louis Formation, lowermost 5 feet exposed in small quarry northeast of road, and Locality 9, St. Louis Formation, 0-3 feet above level of bridge floor.

Genus LONCHODINA Ulrich & Bassler (in Bassler, 1925)
Type species: Lonchodina typicalis Ulrich & Bassler

LONCHODINA sp.
Pl. 2, fig. 27

Because our specimens are poorly preserved, variable, and relatively few in number, a formal name is not applied. The specimens are slightly arched and bowed with three to five discrete, slightly compressed denticles on each of the limbs which are nearly equal in length. The large apical denticle is biconvex, sharp edged fore and aft, with slight carinae in some specimens. The pit is shallow, elongate, pointed anteriorly and posteriorly and has little or no flare to the lips.

Material studied.—20 specimens.

Repository.—Illinois State Geological Survey, 18P30, 18P31 (figured specimens), from Locality 1, St. Louis Formation, sample 3 and Locality 5, St. Louis Formation, 71 to 72½ feet above lowermost beds in quarry.

Genus MAGNILATERELLA Rexroad & Collinson, n.gen.
Type species: Magnilaterella robusta Rexroad & Collinson, n.sp.

Polygnathus Hinde HINDE (part), 1900, Nat. Hist. Soc. Glasgow, Trans., v. 5, n.s., p. 342, pl. 9, figs. 6?, 7, 8.

Lonchodina Ulrich & Bassler BRANSON & MEHL, 1940, Denison Univ. Bull., Jour. Sci. Labs., v. 35, p. 171, pl. 5, fig. 10.

Lonchodina? Ulrich & Bassler BRANSON & MEHL, 1940, Denison Univ. Bull., Jour. Sci. Labs., v. 35, p. 171, pl. 5, fig. 12; YOUNGQUIST & MILLER, 1949, Jour. Paleontology, v. 23, p. 620, pl. 101, figs. 7,8.

Lonchodina? Ulrich & Bassler BISCHOFF (part), 1957, Hess. Landesamt. Bodenf., Abhl., Hf. 19, p. 34, 35, pl. 5, figs. 17, 18.

Metalonchodina Branson & Mehl ELIAS (part), 1956, Petrol. Geol. Southern Oklahoma: Amer. Assoc. Petroleum Geologists, v. 1, p. 124, pl. 5, fig. 3, probably not fig. 2; not p. 126, pl. 5, figs. 8, 9.

Ligonodina Ulrich & Bassler CLARKE (part), 1960, Edinburgh Geol. Soc., Trans., v. 18, pt. 1, p. 9, pl. 1, figs. 14, 15 only.

Ligonodina? Ulrich & Bassler BRANSON & MEHL, 1940, Denison Univ. Bull., Jour. Sci., Labs., v. 35, p. 171, pl. 5, fig. 11.

Genus indeterminate, REXROAD, 1957, Illinois Geol. Survey Rept. Inv. 199, p. 42, pl. 4, figs. 19-22; REXROAD, 1958, Illinois Geol. Survey Rept. Inv. 209, p. 26, pl. 5, figs. 1, 2.

Genus Novum? CLARKE, 1960, Edinburgh Geol. Soc., Trans., v. 18, pt. 1, p. 15, 16, pl. 2, figs. 8, 10, 12, 13.

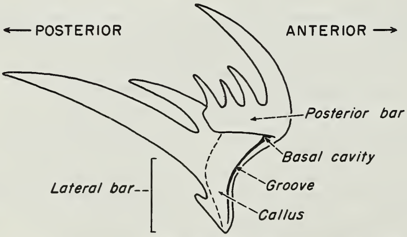
New genus? REXROAD & JARRELL, 1961, Amer. Assoc. Petroleum Geologists Bull., v. 45, p. 2014, 2015.

Derivation of name.—(Lat.) *magnus*, large, and *latus*, side, in reference to the large size of the inner lateral process as contrasted with the posterior bar.

Diagnosis.—Representatives of this genus consist of a small denticulate posterior bar and a large denticulate inner lateral limb. The lateral limb arises from the anterior end of the posterior bar and generally is directed obliquely downward and rearward. The largest denticles are found on the lateral bar, but the anteriormost denticle is not the largest. A basal pit is generally present at the anterior end of the posterior bar or its juncture with the lateral bar and grooves may extend from it along the lower edge of either bar.

Remarks.—For years conodont workers have had difficulty in assigning to any extant genus the *Ligonodina*-like forms we are referring to *Magnilaterella*. Branson & Mehl (1940), who encountered these forms in the lower part of the Caney Formation of Oklahoma, were the first to illustrate them, although they referred their specimens to *Lonchodina*. Youngquist & Miller (1949) reported similar forms from the Pella Formation of south-central Iowa and in 1957, Bischoff recorded them from the cuIIIα-IIIβ Zones in the Harz Mountains of Germany. Bischoff erected a new species, *recurvata*, for his specimens and questionably referred it to *Lonchodina*.

In 1957 and in 1958, Rexroad reported the occurrence of *Ligonodina*-like conodonts from the Golconda Group, the Renault, Paint Creek, Glen Dean, Menard, Clore, and Kinkaid Formations of the Illinois Basin and recognized the fact that they are not referable to any known genus.



Text-fig. 2—Diagram showing orientation and nomenclature for *Magnilaterella*.

Clarke in 1960, reported forms similar to *Magnilaterella* from Carboniferous limestone of Scotland and recorded part of them as Genus Novum? and part as representing a new species of *Ligonodina*; *L. complectens*.

Undoubtedly the reason none of these authors proposed a new genus for their material is that it was relatively scant and incompletely preserved. We are fortunate in having several hundred representatives of the group from midcontinent United States for study, and have satisfied ourselves that the group represents a distinct generic category. Accordingly, we propose the name *Magnilaterella* for the genus and designate *M. robusta*, the type species.

Magnilaterella is closely related to *Ligonodina*, but several differences serve to distinguish the two genera. *Ligonodina* has a relatively long denticulate posterior bar terminated anteriorly by a large cusp and a lateral process which is shorter and in general smaller than the main bar. *Magnilaterella*, on the other hand, consists of a relatively small denticulate posterior bar and a large flexed lateral bar. Whereas the largest denticle in *Ligonodina* is the cusp at the anterior end of the posterior bar, the largest denticles in *Magnilaterella* are found on the midpart of the lateral bar. Both genera possess basal cavities, although such structures tend to be overgrown or closed in mature representatives. Nearly all specimens bear grooves along or near the lower edge of both bars. In *Ligonodina*, however, the pit is beneath the main cusp, whereas in *Magnilaterella* it occurs at the junction of the bars and may be beneath a minor denticle or not directly beneath any particular denticle. Commonly the pit is shared by both lateral and posterior bars.

Although most similar to *Ligonodina*, *Magnilaterella* is also closely related to *Cladognathodus* and *Lambdagnathus*, and where incomplete specimens are studied, may be confused with them. *Cladognathodus* has anterior, posterior and lateral bars and when the anterior bar has been broken off, specimens appear very much like representatives of *Magnilaterella*. The lateral bar in *Cladognathodus* is attached anterior to the largest denticle on the posterior bar and the basal pit occurs below the junction. In addition, the lower edges are grooved. All these characteristics are shared with *Magnilaterella* and each specimen must be carefully examined for break points. In most cases, however, the fact that a specimen possesses only one denticle will serve to identify it as belonging to *Cladognathodus* inasmuch as most representatives of *Magnilaterella* possess two or more. Similarly, the lack of any great difference in size of bars will distinguish *Cladognathodus*.

Incomplete representatives of *Lambdagnathus* appear even closer to our genus than either *Ligonodina* or broken specimens of *Cladognathodus*. *Lambdagnathus* consists of a posterior denticulate bar with anterior and inner lateral bars commonly arranged at nearly 90° to each other and joined at the apical denticle, which is situated over the triangular pit. The posterior bar is generally the shorter. All three bars bear grooves. As in *Magnilaterella*, the largest denticle on the lateral bar commonly occurs near the midpoint. Also as in our genus, the lateral bar possesses an attachment mark or callus on the posterior side and is commonly larger than either of the other bars. Consequently, a specimen whose anterior bar is missing easily can be mistaken for a representative of *Magnilaterella*.

As *Magnilaterella* is here drawn, three species are assigned to it. The most common is the type, *M. robusta*, which is widespread and common in upper Mississippian formations throughout midcontinent United States. *M. robusta* is distinguished by its thick lateral blade bearing two or more major denticles.

More like M. robusta than any other species is M. recurvata (Bischoff) from the cuIIIα -IIIβ Zones of the Harz Mountains in Germany. The two specimens figured by Bischoff (1957, pl. 5, figs. 17, 18)represent only the inner lateral bar but it is apparent that the bar is thinner and relatively longer than in M. robusta.

Magnilaterella complectens (Clarke) from the Carboniferous Lower Limestone at Law, Dalry, the Upper Limestone at Glencart, Dalry, and a shale bed above the Skateraw Middle Limestone at Catcraig, Dunbar, all in Scotland, has a robust lateral bar like M. robusta, but it is much shorter and has only a single major denticle on the lateral bar along with two small denticles.

MAGNILATERELLA ROBUSTA Rexroad & Collinson, n.sp.

Pl. 1, figs. 4, 5, 9; Text-figs. 3A, B, C; 4A, B, C, D, E, F

Lonchodina sp. BRANSON & MEHL (part), 1940, Denison Univ. Bull., Jour. Sci. Labs., v. 35, p. 171, pl. 5, fig. 10 only.

Metalonchodina? sp. ELIAS, 1956, Petroleum Geology of southern Oklahoma: Amer. Assoc. Petroleum Geologists, v. 1, p. 124, pl. 4, fig. 3.

Genus indeterminate REXROAD (part), 1957, Illinois Geol. Survey Rept. Inv. 199, p. 42, pl. 4, figs. 19-21 only; REXROAD, 1958, Illinois Geol. Survey Rept. Inv. 209, p. 26, pl. 5, figs. 1, 2.

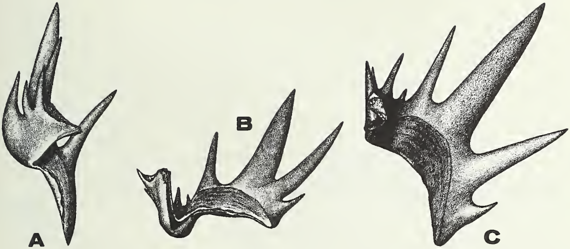
New genus? spp. REXROAD & LIEBE (part), 1962, Micropaleontology, p. 511.

Diagnosis.— A relatively short and thick downward- and rearward-arched inner lateral process bears two or three major denticles and may have one or more minor denticles; the bar is flexed inward. The posterior bar is rather small, relatively straight and bears one or more minor denticles along with an occasional major denticle near the anterior end. The largest denticle on the lateral bar occurs on or near the midpart.

Description.—The unit consists of a small posterior bar and a large inner lateral process which are united at the anterior end of the posterior bar by a sharp flexure. In the bottom view (Text-fig. 3B) of the holotype, the lateral bar joins the posterior at an angle of approximately 50° and is bowed forward through an arc of about 70°. In posterior view (Text-fig. 3C), the lateral bar joins the posterior at an angle of about 45° from the horizontal and arches sharply downward through an arc of nearly 90°.

The posterior bar of this species is short, of variable length, and bowed slightly inward. It bears discrete denticles which may be all of similar size, may alternate in size, or may include relatively large posterior denticles. The largest denticle on the posterior bar occurs near the extreme anterior end or may be posterior to the flexure, in which case minute denticles may be present anterior to it.

The denticulate inner lateral process is larger than the posterior bar and is directed laterally (inward), downward, and posteriorly. It is bowed forward. The lateral bar is relatively thick and in nearly all specimens the posterior face is beveled by an attachment area or callus which extends from near the bases of the denticles to a narrow lower edge, thus giving the bar a wedge-shaped cross section. The upper edge of the beveled face commonly forms a distinct ridge that parallels the bases of the denticles. A similar callus is also found on the inner face of the posterior bar. There are six denticles on the lateral bar of the holotype, two large and four small. The largest occurs near the middle of the unit, with progressively smaller ones occuring toward either end of the bar. The denticles arch posteriorly and do not lie in the same plane. The largest is much larger than any on the posterior bar. Variation in arrangement, number, and shape of denticles in several paratypes is shown in Text-fig. 4.



Text-fig. 3–Three views of the holotype of *Magnilaterella robusta* Rexroad & Collinson, n.sp. A, outer lateral view showing incomplete posterior bar; B, lower view showing pit, groove along lower edge, and angle of juncture between bars; C, posterior view showing outer side of lateral bar, all X60.

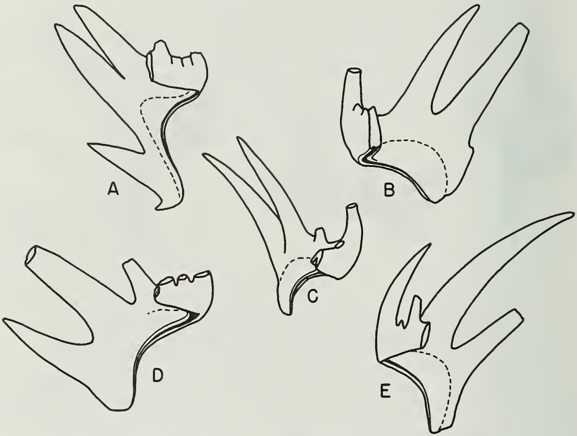
The pit in *M. robusta* is at the anterior end of the lateral bar, is more or less L-shaped, and extends onto the posterior bar. Thus, the area of flexure is a zone of particular weakness. Characteristically, the lower margins of both the inner lateral and posterior bars are grooved.

Remarks.—*Magnilaterella robusta* is by far the most common representative of the genus. It occurs rarely in the St. Louis and Ste. Genevieve Formations but is common in the Golconda Group, the Ridenhower, Glen Dean, Menard, Clore, and Kinkaid Formations of Illinois, Indiana, Kentucky, and Missouri, as well as the Paoli of Indiana, the Pella of Iowa and the Caney of Oklahoma.

Because the species is most common in the Chesterian Series, the holotype is chosen from the Glen Dean Formation (Rexroad, 1958, pl. 5, fig. 2) of the Reilly Lake North locality of Rexroad (1958, p. 8), Randolph County, Illinois, and is here reillustrated by Text-figs. 3A-3C.

In general, *M. robusta* is probably closer to *M. recurvata* (Bischoff) than any other species. Nevertheless, the two are fairly easily distinguished inasmuch as the lateral bar in the former has a maximum height to length ratio of approximately 1:3, whereas the ratio in *recurvata* is 1:5 or more. The maximum height to length ratios of the specimens illustrated by Branson & Mehl from the Caney of Oklahoma (1940, pl. 5, figs. 11, 12) are also greater than 1:5 and they may be referable to *M. recurvata* (Bischoff). Figure 10 of Branson & Mehl is almost certainly a representative of M. robusta.

The species *M. complectens* (Clarke) from Carboniferous limestone in Scotland has a lateral bar that is even shorter and thicker than that of *M. robusta* and has a maximum height to length of lateral bar ratio of between 1:2 and 1:3. The species is further distinguished from *M. robusta* by the fact that it bears only one



Text-fig. 4–Outer lateral views of six paratypes of Magnilaterella robusta illustrating variation in the shape and denticulation of the lateral bar; A, outer lateral view of specimen from the Glen Dean Formation (3P87, Rexroad, 1958, Pl. 5, fig. 1); B, slightly oblique posterior view of specimen (18P72) from the Ste. Genevieve Formation at Locality 10, Unit 16 of Perry, Smith and Wayne, 1954; C, slightly oblique outer view of specimen (16P76) from the Renault Formation, Locality 1 of Rexroad and Liebe, 1962; D, outer lateral view of specimen (18P71) from the Ste. Genevieve Formation, Locality 10, Unit 16 of Perry, Smith and Wayne, 1954, showing nearly complete posterior bar; E, outer lateral view of specimen from the Paoli Formation, Locality 7 of Rexroad and Liebe, 1962. All X60.

large denticle along with three smaller denticles. M. robusta has two to five large denticles on the lateral bar.

Material studied.—More than 400 specimens.

Stratigraphic distribution of types.—

St. Louis Formation:

18P69, Locality 8, 101 to 108 feet above lowermost part of section exposed near west end of Cave In Rock Park.

Ste. Genevieve Formation:

18P70, Locality 5, 36 to 37 feet above base of Ste. Genevieve Formation (fide Weller, 1928, p. 212).

18P71, 18P72, Locality 10, 0-30 inches above base of Unit 16 of Perry, Smith & Wayne, 1954, p. 27.

Renault Formation:

16P76, Locality 2 - sample 12 of Rexroad, 1957, p. 11.

Paoli Formation:
  16P56, Locality 7 of Rexroad & Liebe, 1962, p. 510.
Paint Creek Formation (Ridenhower):
  2P107, Locality 4 - sample 4 of Rexroad, 1957, p. 12.
  2P108, Locality 4 - sample 14 of Rexroad, 1957, p. 12.
  2P110, Locality 6 - sample 40 of Rexroad, 1957, p. 13.
Golconda Group
  2P111, Locality 7 - sample 4 of Rexroad, 1957, p. 13.
Glen Dean Formation:
  3P87, Locality 12 - sample 3 of Rexroad, 1958, p. 15.
  3P88 (holotype), Locality 1 - sample 40 of Rexroad, 1958, p. 18.

Types.—Illinois Geological Survey, 3P88 (holotype): all other specimens listed above are paratypes.

MAGNILATERELLA SPP.

Pl. 2, figs. 1, 3, 6, 10

Several relatively complete specimens cannot be specifically assigned but appear referable to *Magnilaterella*. The specimens shown by figures 1 (18P19) and 3 (18P85) on Plate 2 seem to be intermediate between *M*. *robusta* and *M*. *recurvata* (Bischoff), being not as heavy as the latter nor as slender as the former. In both, the size difference between posterior and lateral bars is not as great as in *M*. *robusta*, and they appear to be somewhat closer to *Ligonodina* and therefore more primitive than *M*. *robusta*. Both specimens are from the St. Louis Formation. 18P19 came from 21 to 23 feet above the lowermost part of the St. Louis Formation exposed at Locality 5. 18P85 came from 23 to 35 feet above the base of the section at Locality 8.

The specimen shown by figure 10 (18P66) on Plate 2 likewise belongs in *Magnilaterella* but is distinct from other forms in that the anteriormost denticle projects slightly beyond the junction of posterior and lateral bars and therefore appears to represent a trend toward the evolution of *Lambdagnathus*. The general configuration of the specimen likewise favors *Lambdagnathus* rather than *Cladognathodus*, in that it possesses several major denticles on the lateral bar. The specimen is from Locality 5, four to six feet above the lowest exposed beds in the St. Louis Formation.

Least like the type species of *Magnilaterella*, but almost certainly referable to the genus, is the form illustrated by figure 6, Plate 2 (18P86). It represents a relatively long posterior bar bearing the marks of at least 8 denticles. The posterior bar is joined at the anterior end by a very short thick lateral bar which bears a single large denticle along with one minor denticle. The angle between the bars is about 45°. The specimen came from units 6 and 7 in the Springfield Quarry, Locality 10. This form is very close to *M*. *complectens* (Clarke), from the Lower Limestone, Law, Dalry, Scotland, although the angle between the bars in Clarke's specimen appears more acute and it has two minor denticles on the lateral bar in addition to a single large denticle.

Repository.—Illinois State Geological Survey, 18P19, 18P66 (figured specimens), St. Louis Formation, Locality 5, 21-23 feet and 4-6 feet, respectively, above the lowest St. Louis beds exposed in the quarry; 18P85 (figured specimen), St. Louis Formation, Locality 8, 23-25 feet above base of section; 18P86 (figured specimen), St. Louis Formation, Units 6 and 7.

Genus NEOPRIONIODUS Rhodes & Müller, 1956
Type species: Prioniodus conjectus Gunnell

NEOPRIONIODUS TULENSIS (Pander)
Pl. 2, figs. 17, 22, 23

Prioniodus tulensis PANDER (part), 1856, Mono. der fossilen Fische des silurischen Systems, p. 30, pl. 2A, fig. 1 only (not figs. 18-20); HOLMES (part), 1928, U. S. Natl. Mus., Proc., v. 72, art. 5, p. 22, pl. 3, fig. 18 only (not figs. 16, 17, 20-22).

Prioniodus cassilaris BRANSON & MEHL, 1940, Denison Univ. Bull., Jour. Sci. Labs., v. 35, p. 186, pl. 6, figs. 11, 12, 15, 17; YOUNGQUIST, MILLER & DOWNS, 1950, Jour. Paleontology, v. 24, p. 528, pl. 67, figs. 23, 24.

Prioniodina cassilaris (Branson & Mehl) BISCHOFF, 1957, Hess. Landesamt. Bodenf. Abhl., Hf. 19, p. 47, pl. 5, figs. 38,39.

Pander figures as P. tulensis specimens which, as presently understood, would be referred to two genera. His figure 1 should be referred to Neoprioniodus Rhodes & Müller and figures 18, 19 and 20 to Ligonodina Ulrich & Bassler. Because it was figured first and because it fits more closely with modern generic concepts, we designate Pander's specimen shown by his figure 1, plate 2A, as the holotype, and we refer the species to Neoprioniodus.

The middle Mississippian species Prioniodus cassilaris Branson & Mehl as shown by our studies of Burlington, Keokuk, Warsaw, Salem, and St. Louis specimens is quite variable. The species includes specimens closely similar to Pander's specimen from Carboniferous limestone in Russia, for example our figure 31 on Plate 2, and we therefore consider P. cassilaris a synonym.

Neoprioniodus scitulus (Branson & Mehl) is closely similar to P. tulensis and is quite variable. It is possible that it too should be included in synonomy, but atavistic specimens of N. scitulus may overemphasize the impression of similarity.

Material studied.—147 specimens.

Repository.—Illinois State Geological Survey, 18P32 (figured specimen), Locality 6, St. Louis Formation, 75 to 76 feet above road level northeast of road; 18P33 (figured specimen), Locality 5, St. Louis Formation, 23-25 feet above base of section; 18P34, Locality 5, St. Louis Formation, 25-28 feet above base of section; 18P35, Locality 2, St. Louis Formation, bed H; 18P36, Locality 2, St. Louis Formation, bed L; 18P37 (figured specimen), Locality 2, St. Louis Formation, bed D.

NEOPRIONIODUS LOXUS Rexroad
Pl. 2, fig. 28

Neoprioniodus loxus REXROAD, 1957, Illinois Geol. Survey Rept. Inv. 199, p. 34, pl. 2, figs. 8, 9, 14; REXROAD, 1958, Illinois Geol. Survey Rept. Inv. 209, p. 23, pl. 5, figs. 7-9; REXROAD & BURTON, 1961, Jour. Paleontology, v. 35, p. 1155, pl. 140, fig. 12.

Neoprioniodus tenuis REXROAD, 1957, Illinois Geol. Survey Rept. Inv. 199, p. 35, pl. 2, figs. 13, 16.

Material studied.—13 specimens from this study.

Repository.—Illinois State Geological Survey, 18P38 (figured specimen), St. Louis Formation, Locality 2, bed B.

NEOPRIONIODUS VARIANS (Branson & Mehl)

Prionodus varians BRANSON & MEHL, 1940, Denison Univ. Bull., Jour. Sci. Labs., v. 35, p. 174, pl. 5, figs. 7, 8.

Prioniodina varians (Branson & Mehl) BISCHOFF, 1957, Hess. Landesamt. Bodenf., Abhl., Hf. 19, p. 49, pl. 5, fig. 35; FLÜGEL & ZIEGLER, 1957, Naturwissenschaftlichen vereines f. Steirmark, Mitteil., Bd. 87, p. 50.

Neoprioniodus varians (Branson & Mehl) REXROAD, 1957, Illinois Geol. Survey Rept. Inv. 199, p. 35, pl. 2, fig. 10; REXROAD, 1958, Illinois Geol. Survey Rept. Inv. 209, p. 24, pl. 5, figs. 3, 4; HIGGINS, 1961, Geol. Mag., v. 98, pl. 11, fig. 1; REXROAD & BURTON, 1961, Jour. Paleontology, v. 35, p. 1155, pl. 140, figs. 9, 10.

Prioniodus barbatus Branson & Mehl ELLISON & GRAVES (part), 1941, Missouri School of Mines & Metallurgy Bull., Tech. Ser., v. 14, no. 3, pl. 1, fig. 27 only.

Material studied.—28 specimens from this study.

Repository.—Illinois State Geological Survey, 18P39 (figured specimen), St. Louis Formation, Locality 2, zero to five feet above base of abandoned quarry northeast of the road.

Genus OZARKODINA Branson & Mehl, 1933

Type species: *Ozarkodina typica* Branson & Mehl

OZARKODINA CURVATA Rexroad

Pl. 2, fig. 11

Ozarkodina curvata REXROAD, 1958, Illinois Geol. Survey Rept. Inv. 209, p. 24, pl. 4, figs. 1-3; REXROAD & BURTON, 1961, Jour. Paleontology, v. 35, p. 1156, pl. 141, figs. 13, 14.

Material studied.—7 specimens from this study.

Repository.—Illinois State Geological Survey, 18P40 (figured specimen), St. Louis Formation, Locality 9, 40-45 feet above bridge.

OZARKODINA LAEVIPOSTICA Rexroad & Collinson, n.sp.

Pl. 1, figs. 1-6

Diagnosis.—This is a small bowed unit with a large apical denticle and sharply downturned anterior limb. The posterior limb is only partially denticulate and, on its lower side, has an extension of the pit nearly to the posterior tip.

Description.—These small specimens, surmounted by a large, sharp-edged, recurved apical denticle, are arched and bowed with the anterior limb typically turned sharply downward somewhat like the inner lateral process of some ligonodinids. The anterior limb typically bears four or five laterally compressed, appressed denticles. On the posterior limb, typically there are only one or two minute denticles adjacent to the apical denticle and the remainder of the limb is nondenticulate. Some specimens have no denticles at all and a few have only four or five denticles which occupy the entire length of the limb. The pit is deep. It comes to a point beneath the apical denticle, and has a flaring inner lateral lip which in convexity approximates the outline of the outer edge of specimens which typically lack a flaring lip. The pit, viewed from below, is doubly pointed and extends nearly to the posterior tip; anteriorly it continues only a short distance along the lower margin of the anterior limb which otherwise is sharp edged.

Material studied.—39 specimens.

Repository.—Illinois State Geological Survey, 18P41 (holotype), St. Louis Formation, Locality 9, 40-45 feet above bridge; 18P42-18P46 (paratypes), St. Louis Formation, Locality 2, collected from beds D, D, D, H, and H, respectively.

OZARKODINA sp.

Pl. 2, fig. 13

This group of specimens is poorly preserved so that it is difficult to recognize critical characteristics. Although the specimens seem to form a group, even though varying, they resemble in recognizable features such species as O. mutabilis Branson & Mehl, O. delicata Stauffer & Plummer, O. recta and O. compressa of Rexroad, and O. elongata Branson.

Material studied.—37 specimens.

Repository.—Illinois State Geological Survey, 18P47, St. Louis Formation, Locality 8, 17-19 feet above lowest part of section; 18P48 (figured specimen), St. Louis Formation, Locality 5, 41-44 feet above lowest beds in quarry.

Genus SPATHOGNATHODUS Branson & Mehl, 1941

SPATHOGNATHODUS SCITULUS (Hinde)

Pl. 2, figs. 14, 19, 29-31

Polygnathus scitulus HINDE (part), 1900, Nat. Hist. Soc. Glasgow, Trans., v. 5, n.s., p. 343, pl. 9, figs. 9, 11 only (not fig. 10).

Panderodella scitula (Hinde) HOLMES (part), 1928, U. S. Natl. Mus., Proc., v. 72, art. 5, p. 16, pl. 6, figs. 26, 28 only (not fig. 27).

Spathognathodus scitulus (Hinde) CLARKE, 1960, Edinburgh Geol. Soc., Trans., v. 18, pt. 1, p. 21, pl. 3, figs. 12, 13.

This is the most constant, least variable species in the St. Louis Formation. Hinde figured as Polygnathus scitulus three markedly different specimens, which we believe represent different species. His first figure, fig. 9, must be accepted as the type of Spathognathodus scitulus and we designate it so. The St. Louis specimens conform very closely to the specimen represented by figure 9 and we place them in this species.

Material studied.—339 specimens.

Repository.—Illinois State Geological Survey, 18P49-18P55 (figured specimens), St. Louis Formation, Locality 2, beds H, N, H, B, D, and D, respectively.

Genus TAPHROGNATHUS Branson & Mehl, 1940

Type species: Taphrognathus varians Branson & Mehl

A number of St. Louis specimens are difficult to place generically because they are transitional in form between Taphrognathus and Cavusgnathus. Four of these are figured (Pl. 1, figs. 21, 23-25) to show the nature of this transition. In one type of transition the blade remains straight and separate from the parapets but shifts from the median to the outer lateral position and in extreme forms is separated from the parapet by only a slight notch. This is the common type of transition. In the other type, the anterior portion of the blade remains in a nearly median position but the posterior portion curves so as to unite with the outer parapet.

Material studied.—11 specimens.

Repository.—Illinois State Geological Survey, 18P56 (figured specimen), St. Louis Formation, Locality 2, bed A; 18P57 (figured specimen), St. Louis Formation, Locality 1, Sample 18; 18P58 (figured specimen), St. Louis Formation, Locality 10, six to nine feet from lowest part of quarry; 18P59 (figured specimen), St. Louis Formation, Locality 2, bed B.

TAPHROGNATHUS VARIANS Branson & Mehl

Pl. 1, figs. 18-20, 22

Taphrognathus varians BRANSON & MEHL, 1940, Denison Univ. Bull., Jour. Sci. Labs., v. 35, p. 182, pl. 6, figs. 27-33, 35-40.

Material studied.—16 specimens.

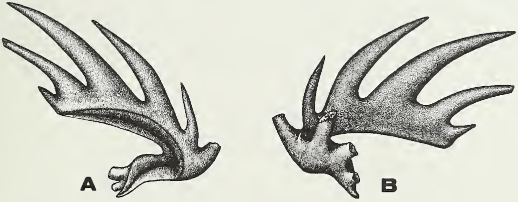
Repository.—Illinois State Geological Survey, 18P60-18P62 (figured specimens), St. Louis Formation, Locality 1, Samples 14, 18, and 18, respectively; 18P63 (figured specimen), St. Louis Formation, Locality 2, bed A.

NEW GENUS AND NEW SPECIES

Pl. 2, figs. 2, 7, 8; Text-figs. 5A, B

Diagnosis.—A denticulate posterior bar that is large, long, and straight or nearly so is attached to a relatively small denticulate lateral bar at the latter's anterior end and extends inward and rearward. There are generally three major denticles on the main bar and they curve posteriorly in the plane of the bar. Both bars are truncated along the lower edge and bear narrow median grooves. The lateral bar bears small denticles along with one or two larger denticles, none of which is as large as those on the posterior bar.

Description.—The most nearly complete representative (Text-figs. 5A, B; Pl. 2, fig. 8) of this species consists of a large posterior bar and a small inner lateral process which are united at the anterior end of the former at an angle of approximately 30°. The lateral bar joins the posterior bar at an angle of about 40° from the horizontal, arches downward approximately 60°, and is flexed inward to give it a sigmoidal configuration. The posterior bar arches downward approximately 15°.



Text-fig. 5—New genus and species; A, lower oblique view of outer side; B, inner lateral view of specimen from Ste. Genevieve Formation illustrated on Plate 2, figure 8, X60.

EXPLANATION OF PLATE 1

All figures X40

Numbers in parentheses refer to specimen number.

FIGS.	
1,6	*Ozarkodina laevipostica* Rexroad & Collinson, n.sp. 1,2,3, Inner lateral, outer lateral, and inner lateral views, respectively, of paratypes (18P42, 18P43, 18P44); 4, inner lateral view of holotype (19P41); 5,6, outer lateral and inner lateral views, respectively, of paratypes (18P45, 18P46).
7-11	*Apatognathus*? *porcata* (Hinde). Inner lateral, outer lateral, inner lateral, inner lateral, and outer lateral views, respectively (18P1, 18P2, 18P3, 18P4, 18P5).
12-17	*Apatognathus*? *gemina* (Hinde). 12-15, Inner lateral views of a juvenile and three adults (18P11, 18P10, 18P9, 18P8); 16, outer lateral view (18P7); 17, inner lateral view (18P6).
18-20,22	*Taphrognathus varians* Branson & Mehl. 18a,b, Inner lateral and oral view (18P60); 19, oral view (18P61); 20, aboral view (18P62); 22a,b, inner lateral and aboral views (18P63).
21,23-25	*Taphrognathus-Cavusgnathus* transitions. 21a,b, Inner lateral and oral views (18P56); 23-25, oral views (18P57, 18P58, 18P59).
26,27	*Cavusgnathus unicornis* Youngquist & Miller. Inner lateral views (18P14, 18P15).
28	*Cavusgnathus regularis* Youngquist & Miller. Inner lateral view (18P13).
29	*Cavusgnathus characta* Rexroad. Inner lateral view (18P12).
30-32	*Cavusgnathus* n.sp. Inner lateral, aboral, and oral views, respectively (18P16, 18P17, 18P18).

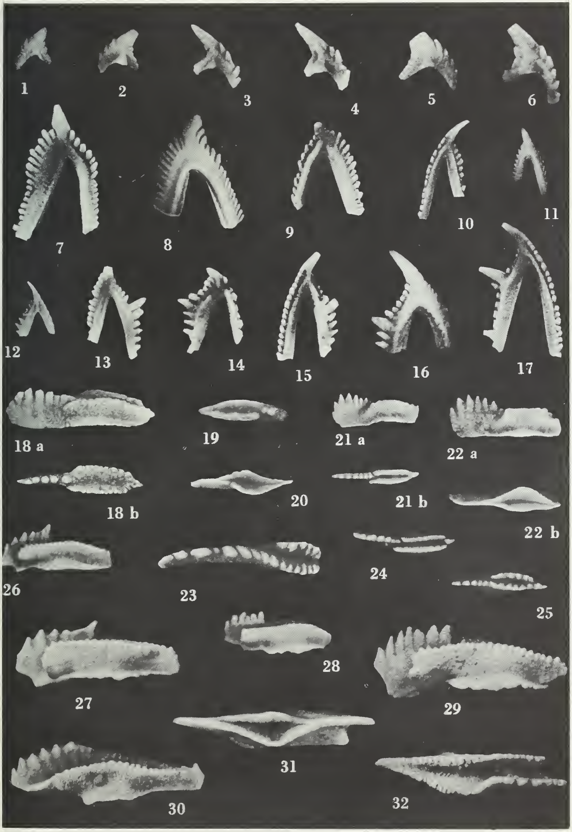


PLATE 1 REXROAD & COLLINSON

EXPLANATION OF PLATE 2

All figures x40

Numbers in parentheses refer to the specimen number.

FIGS.	
1, 3, 6, 10	*Magnilaterella* spp. 1, 3, Outer oblique views (18P19), 18P85); 6, inner upper oblique view 18P86); 10, inner oblique view (18P66).
4, 5, 9	*Magnilaterella robusta* Rexroad & Collinson, n.gen., n.sp. 4, Posterior oblique view of incomplete paratype (18P72); 5, posterior oblique view of nearly complete paratype (18P71); 9, outer view of unusually large lateral bar (18P69).
2, 7, 8	New genus and new species. 2, Outer side view of large incomplete lateral bar (18P77); 7, lower side view of incomplete lateral bar showing groove along lower edge (18P76); 8, outer oblique view of nearly complete specimen (18P75).
11	*Ozarkodina curvata* Rexroad. Inner lateral view (18P40)
13	*Ozarkodina* sp. Inner lateral view (18P47).
12, 16	*Hibbardella ortha* Rexroad. 12, Posterior view (18P25); 16, lateral view (18P24).
15, 18, 20, 21	*Hibbardella abnormis* Branson & Mehl. 15, Oblique anterior view (18P22); 18, lateral view (18P23); 20, posterior view (18P21); 21, lower view (18P20).
14, 19, 29-31	*Spathognathodus scitulus* (Hinde). 14, Outer lateral view (18P55); 19, upper view (18P53); 29, outer lateral view of juvenile (18P49); 30, lower view (18P50); 31, outer lateral view (18P54).
17, 22, 23	*Neoprioniodus tulensis* (Pander). 17, Outer lateral view (18P33); 22, inner lateral view of juvenile (18P32); 23, inner lateral view (18P37).
26	*Neoprioniodus varians* (Branson & Mehl). Inner lateral view (18P39).
28	*Neoprioniodus loxus* Rexroad. Inner lateral view (18P38).
27	*Lonchodina* sp. Inner lateral view (18P31).
24, 25	*Ligonodina levis* Branson & Mehl. 24, Inner lateral view (18P27); 25, outer lateral view (18P29).
32	*Hindeodella* sp. Inner lateral view (18P26).

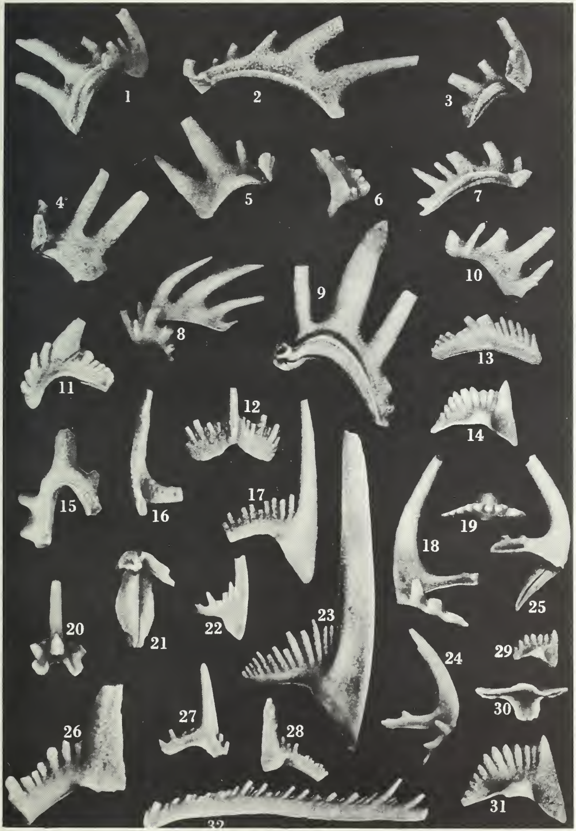

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32

PLATE 2

The lateral bar is denticulate and short. It bears up to five denticles ranging in size from small to moderately large. There is generally a relatively large denticle at the point of juncture between the bars. None of the denticles on the shorter bar is as large as the major denticles on the posterior bar.

The posterior bar is much larger than the lateral, which is directed inward and rearward. Denticles on the main bar are recurved toward the posterior in the same plane, and have thick bases and elongate cross-sections. In our single nearly complete specimen there are three major denticles with minor denticles positioned both anterior and posterior from them. There is a prominent callus on the inner side of the lateral bar, but none on the posterior. The truncated lower edges of the bars are slightly depressed and form shallow open troughs. Median grooves run along the troughs.

We have only a single relatively complete representative of this form along with a dozen incomplete specimens, which we feel does not represent sufficient material for erection of a formal generic category. Nevertheless, it is apparent that the specimens are not referable to any extant genus or species and should be named in the future, upon adequate numbers of specimens.

This form appears to be confined to the St. Louis and Ste. Genevieve Formations, although at least two similar specimens from the lower part of the Chesterian Series have been seen. The species is rare and has been identified with confidence only at Localities 5 and 10.

Material studied.—12 specimens.

Stratigraphic distribution of numbered specimens.—

St. Louis Formation:
   18P76, Locality 4, uppermost 10 feet of St. Louis Formation.
Ste. Genevieve Formation:
   18P75 (figured specimen), Locality 5, 36 to 37 feet above base of Ste. Genevieve Formation (Weller, 1928, p. 212).
   18P77, Locality 10, lowermost 3 feet of Unit 7 of Perry, Smith, & Wayne, 1954, p. 28.

REFERENCES

Bischoff, Günther, 1957, Die Conodonten-Stratigraphie des rheno-herzynischen Unterkarbons mit Berücksichtigung der Wocklumeria-Stufe und der Devon/Karbon-Grenze: Abh. hess. L.-Amt. Bodenforsch., v. 19, 64 p., 6 pls.

Branson, E. B., and Mehl, M. G., 1940, Caney conodonts of Upper Mississippian age: Denison Univ. Bull., Jour. Sci. Labs., v. 35, art. 5, p. 167-178, pl. 5.

Clarke, W. J., 1960, Scottish Carboniferous conodonts: Edinburgh Geol. Soc. Trans., v. 18, pt. 1, p. 1-31, pls. 1-5.

Collinson, Charles, Scott, Alan J., and Rexroad, C. B., 1962, Six charts showing biostratigraphic zones and correlations based on conodonts from the Devonian and Mississippian rocks of the Upper Mississippi Valley: Illinois Geol. Survey Circ. 328, 32 p.

Collinson, Charles, Swann, D. H., and Willman, H. B., 1954, Guide to the structure and Paleozoic stratigraphy along the Lincoln Fold in western Illinois: Illinois Geol. Survey Guidebook 3, 75 p.

Collinson, Charles, and Swann, D. H., 1958, Field Trip No. 3, Mississippian rocks of western Illinois: Geol. Soc. America St. Louis Meeting Field Trip Guidebook, p. 21-32.

Cumings, E. R., 1901, The use of Bedford as a formational name: Jour. Geology, v. 9, p. 232-233.

Elias, M. K., 1956, Upper Mississippian and Lower Pennsylvanian formations of south-central Oklahoma; Petroleum geology of southern Oklahoma: Am. Assoc. Petroleum Geologists, v. 1, p. 56-134, pls. 1-6.

Elias, M. K., 1959, Some Mississippian conodonts from the Ouachita Mountains; The geology of the Ouachita Mountains: Dallas and Ardmore Geol. Socs., p. 140-165.

Ellison, S. P., Jr., and Graves, R. W., 1941, Lower Pennsylvanian (Dimple Limestone) conodonts of the Marathon Region, Texas: Missouri School of Mines and Metallurgy Bull., Tech. Ser., v. 14, no. 3, p. 1-21, pls. 1-3.

Engelmann, G., 1847, Remarks on the St. Louis Limestone: Am. Jour. Sci., 2nd ser., v. 3, p. 119, 120.

Flügel, Helmut, and Ziegler, Willi, 1957, Die Gliederung des Oberdevons und Unterkarbons am Steinburg westlich von Graz mit Conodonten: Mitteilungen Naturw. Vereins f. Steiermark, v. 87, p. 25-60, pls. 1-5.

Higgins, A. C., 1961, Some Namurian conodonts from North Staffordshire: Geol. Mag. [Great Britain], v. 98, p. 210-224.

Hinde, G. J., 1900, in Smith, John, Conodonts from the Carboniferous limestone strata of the west of Scotland: Glasgow Nat. Hist. Soc. Trans., v. 5, n.ser., p. 336-346, pls. 9, 10.

Holmes, G. B., 1928, A bibliography of the conodonts with descriptions of early Mississippian species: U. S. Natl. Mus. Proc., v. 72, art. 5, p. 1-38, pls. 1-11.

Lys, M., and Serre, B., 1957, Étude de conodontes du Dévonien et du Carbonifère de la région d'Adrar-Tanezrouft (Sahara); Inst. Franç. Pétrole Rev., v. 12, no. 10, p. 1035-1066, pls. 1-7.

McGrain, Preston, and Walker, Frank, 1954, Geology of the Mammoth Cave Region, Barren, Edmonson, and Hart Counties, Kentucky: Kentucky Geol. Soc. Field Trip Guidebook, 32 p.

Pander, C. H., 1856, Monographie der fossilen Fische des silurischen Systems: St. Petersburg, Kaiserl. Akad. Wiss., 91 p., pls. 1-7.

Perry, T. G., Smith, Ned, and Wayne, W. J., 1954, Salem Limestone and associated formations in south-central Indiana: Indiana Geol. Survey Field Conf. Guidebook No. 7, 73 p.

Rexroad, C. B., 1957, Conodonts from the Chester Series in the type area of southwestern Illinois: Illinois Geol. Survey Rept. Inv. 199, 43 p., 4 pls.

Rexroad, C. B., 1958, Conodonts from the Glen Dean Formation (Chester) of the Illinois Basin: Illinois Geol. Survey Rept. Inv. 209, 27 p., 6 pls.

Rexroad, C. B., and Burton, R. C., 1961, Conodonts from the Kinkaid Formation (Chester) in Illinois: Jour. Paleontology, v. 35, p. 1143-1158, pls. 138-141.

Shumard, B. F., 1860, Observations on the geology of the county of Ste. Genevieve: St. Louis Acad. Sci. Trans., v. 1, p. 406.

Ulrich, E. O., 1904, *in* Buckley, E. R., and Buehler, H. A., The quarrying industry of Missouri: Missouri Bur. Geology and Mines, ser. 2, v. 2, p. 109-111.

Weller, Stuart, and St. Clair, Stuart, 1928, Geology of Ste. Genevieve County, Missouri: Missouri Bur. Geology and Mines, ser 2., v. 22, p. 1-352, pls. 1-15.

Youngquist, Walter, and Miller, A. K., 1949, Conodonts from the late Mississippian Pella beds of south-central Iowa: Jour. Paleontology, v. 23, p. 617-622, pl. 101.

Illinois State Geological Survey Circular 355
28 p., 2 pls., 5 text-figs., 1 table, August, 1963

Printed by Authority of State of Illinois, Ch. 127, IRS, Par. 58.25.

CIRCULAR 355

ILLINOIS STATE GEOLOGICAL SURVEY

URBANA